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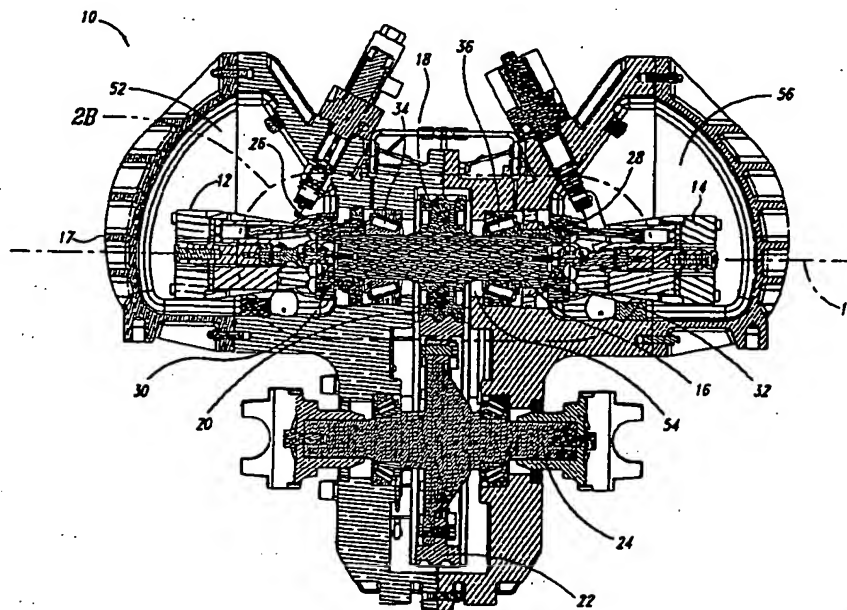
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[Continued on next page]

(54) Title: OPPOSING PUMP/MOTORS



(57) Abstract: Two motors (12, 14) are arranged on opposing sides of a common shaft (16), drive plates (30, 32) of the pump/motors (12, 14) being rigidly coupled to each other, for example by being in hard contact with opposing sides of the shaft (16). Control means are provided for selectively moving the two pump/motors substantially simultaneously to a selected displacement angle, using mechanical systems alone and in combination with hydraulic systems.

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/019274

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B60K6/00 F01B3/00 F04B1/12 F01B3/10 F04B1/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B60K F01B F04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01/51870 A (US ENVIRONMENT) 19 July 2001 (2001-07-19) the whole document	1-27
X	CH 325 587 A (THOMA HANS PROF DR ING) 15 November 1957 (1957-11-15) figures 1,3,4,8	1-27
A	US 3 442 181 A (OLDERAAN WILHELMUS FRANCISCUS) 6 May 1969 (1969-05-06) column 5, line 17 - column 6, line 22; claim 1; figures 1,6	1-27
A	US 2 875 701 A (HEINRICH EBERT) 3 March 1959 (1959-03-03) column 2, line 28 - column 3, line 17; figure 1	1-27
	-/-	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
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T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

Z document member of the same patent family

Date of the actual completion of the international search

26 January 2005

Date of mailing of the international search report

17. 2. 05

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/019274

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 956 407 A (GRABOW FRITZ G) 18 October 1960 (1960-10-18) column 4, lines 17-34; figures 1,5	30-40
X	GB 992 334 A (DOWTY HYDRAULIC UNITS LTD) 19 May 1965 (1965-05-19) page 3, lines 10-36; claims 1,3,4; figure 1	30-40
X	DE 15 28 469 A (LINDE AG) 29 April 1971 (1971-04-29) claim 1; figures 1,2	30-40
X	DE 26 49 127 A (LINDE AG) 3 May 1978 (1978-05-03) figure 1	36-40
A	DE 21 01 963 A (MOLLY) 20 July 1972 (1972-07-20) the whole document	28-40
A	US 3 081 647 A (BLENKLE HERBERT A) 19 March 1963 (1963-03-19) figures 1,4-7	28-40
A	EP 1 092 870 A (AIDA ENG LTD) 18 April 2001 (2001-04-18) paragraphs '0030! - '0034!; claims 1,4; figures 3-6	28-40

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2004/019274

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-27

Hydraulic transmission using opposing pump/motors

2. claims: 28-40

Changing the displacement of a plurality of bent-axis piston machines

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US2004/019274

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